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ABSTRACT

This training material provides the reader with information on the installation of and instruction in the use of the on-line Novell Netware V2.15 training software, and consists of an Instructor's Guide and Student Handouts. The instructor's guide includes the following sections: system requirements; installation; starting the tutorial; completing the tutorial; pretest/posttest; scorekeeper--evaluation results database; a written test consisting of 13 true/false, 15 multiple choice and 11 fill-in-the-blank questions; a glossary; and the pretest/posttest answer key. The student handout to be used in the training consists of the following 11 lessons: network basics; directory structure; mappings; command line utilities; menu utilities; login scripts; security; custom menu system; printing; and console commands. A copy of the site license is also provided. (MAS)

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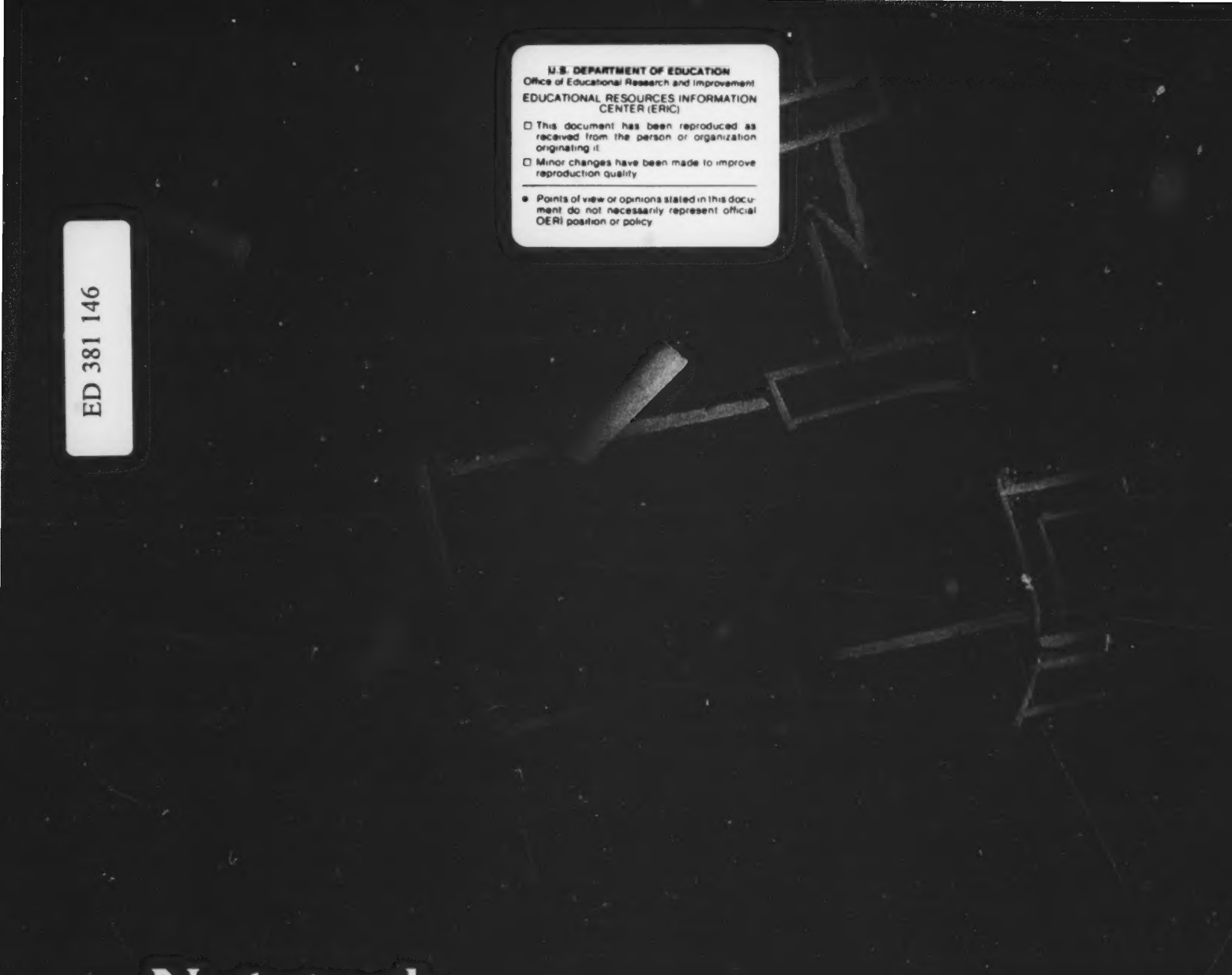

Network Simulation Training

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Instructor's Guide

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NETWORK SIMULATION TRAINING
Series #BO1038
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NETWORK SIMULATION TRAINING
INSTRUCTOR'S GUIDE and
STUDENT HANDOUTS

Business Education Division
Oklahoma Department of Vocational & Technical Education

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System requirements

The on-line Novell Netware V2.15 training software is designed to run on any PC that has:

- 286 or higher IBM-compatible processor
- 640K RAM
- 3MB available hard disk space

Installation

The software that contains the network training tutorial and pretest/posttest instrument is on three diskettes. These diskettes are numbered and labeled as SYSADM/BACKUP. To install the software on the hard disk, complete the following steps:

1. Verify that no subdirectory named SYSADM exists on the root directory.

2. Insert the tutorial diskette labeled SYSADM/BACKUP #01 in drive A.

3. At the C:\ prompt, key: A: INSTALL and press [ENTER].

4. Follow the screen prompts to complete the installation. The prompts include the diskette number to insert.

Starting the tutorial

To start the Novell training tutorial, perform the following steps:

1. Change the current directory to C:\SYSADM

   Key: CD\SYSADM
   Press [ENTER]

2. Enter the startup command.

   Key: SYSADM
   Press [ENTER]

Completing the tutorial

Introduction and convention sections are provided within the tutorial software to guide the user through the training lessons. The lessons are easy to follow, with lesson outcomes supported through concept explanations and hands-on practice.

It is up to the student to keep track of lesson completion. You may decide to provide students with a check-off list to document their completion.

The tutorial software does not track lessons. Therefore, if a partial lesson is completed at the end of the training session, the student would begin the next network training session at the start of the specific lesson number.

At any point in a lesson, students can return to the main menu by pressing the F1 key.

Pretest/posttest

An on-line testing instrument is included as a separate feature of the On-Line Network Simulation training. You may choose to store these files in a different location for administrative purposes.

Required on-line testing files:

!EVAL
EVALUATE.BAT
EVALUATE.!00
TRUN.EXE
QUIZFILE.DAT
QUIZFILE.IX

NOTE: The first file (!EVAL) contains the test results in ASCII format. This file may also be imported into applications such as WordPerfect or dBase as needed.

To start the Novell training pretest/posttest evaluation module, follow these steps:

1. Change the current directory to C:SYSADM (or the directory where you have the evaluation files stored).

   Key: CD\SYSADM
   Press [ENTER]

2. Enter the startup command.

   Key: EVALUATE
   Press [ENTER]

At the end of the testing process, the software will display the student's evaluation result as a range score. The student will be notified that she or he scored in the range of either 85-100%, 65-85%, or below 65%. Refer to the next section for information concerning the process of viewing student test results.

Scorekeeper - evaluation results database

A "browser" program, SCOREKPR.EXE, has been provided to allow you to view student test results. To start the pretest/posttest view program, follow these steps:

1. Change the current directory to C:\SYSADM (or the directory where you have the evaluation files stored).

   Key: CD\SYSADM
   Press [ENTER]

2. Enter the startup command.

   Key: SCOREKPR
   Press [ENTER]

3. Use the Up/Down Arrow keys to highlight the option:

   ASCII file of test answers
   Press [ENTER]

   NOTE: If you want to print out the entire answer file, press [F5] and follow the prompts. (The test name is EVAL.)

4. Enter the test name.

   Key: EVAL
   Press [ENTER]

After Step 4 is completed, a menu will appear. Highlight the appropriate option to select student results, or press [ESC] to exit. After choosing one of the menu options and pressing [ENTER], you may be prompted to enter additional information. The menu options include:

- **Database of test scores**

  This uses virtually the same method to view results as the ASCII option. The ASCII option is used in this guide because the file format may easily be imported into other software applications.

- **All records**

  Displays the test results for all of the records stored in the disk file.

- **Date**

  Shows the test results for one or two dates.

- **Name of Student**

  Displays the test results by student name. Enter the complete name or part of the name. For example, you could enter "wil" for the last name and press [ENTER] for the first name. The view program would show you all of the test results for students Joe Wilson and Melissa Williams. Enter more of the letters in the last and first names to narrow the search.

- **ID Number of Student**

  Shows the test results by ID number. Enter the student's ID number that was used when the test was taken.

If any matches occur using any of the above options, a box will appear containing the selected test data. You may scroll using the Up/Down Arrow keys or the Up/Down Page keys. You may use the other available option keys listed at the bottom of the screen to print or view other records.

The displayed data includes name, date, test ID, test numbers, and answers. Any question answered incorrectly will have an asterisk (*) to the left of the question number.

WRITTEN TEST For questions 1-13, write a T beside each true statement and an F for each false statement.

____1. Wide area networks (WANs) differ from local area networks (LANs) primarily in the number of workstations attached to the network.

____2. Netware provides the NDIR and NCOPY commands because the DOS commands DIR and COPY cannot be executed after the user has logged into a network.

____3. The system login script can only be created by the supervisor using the SYSCON menu utility.

____4. Using normal exit procedures of WordPerfect creates the proper file format for the Novell menuing system.

____5. Password security can only be assigned by the supervisor.

____6. The MONITOR console command is used to display the type of video cards installed in the attached workstations.

____7. Similar to the DOS file structure, the network file server may contain only 1 root directory, which is called a volume in Netware.

____8. Netware uses IPX/SPX as its protocol.

____9. The first step a user performs to gain access to a network is to login.

____10. Netware provides a command line utility and a menu utility to change the name of a subdirectory.

___11. Network drive pointers are usually used to reference executable files located in a directory other than the current directory.

___12. Menu utilities represent a better tool to manage the network compared to command line utilities.

___13. Other than those established by default settings, print queues are attached to printers only through the use of console commands.

For questions 14-28, choose the correct answer and write the letters in the blanks.

___14. Which of the following is not a benefit of networking PCs?

A. Users can share a variety of hardware devices
B. Fewer workstations have to be purchased
C. A network provides a central point of control
D. Users can share data residing on network disks

___15. Which of the following is not a type of login script?

A. Server
B. Default
C. System
D. User

___16. Console commands are executed from

A. The file server's keyboard
B. The filer server's AUTOEXEC.SYS file
C. Either A or B
D. Either A or B or designated workstations

____17. Which of the following are Netware drive pointers?

A. Network drive pointers
B. Search drive pointers
C. Both A and B
D. None of the above

____18. The maximum number of search drive pointers that may be assigned is

A. 5
B. 21
C. 26
D. None of the above

____19. The rights mask is implemented through

A. GRANT
B. SYSCON
C. FILER
D. None of the above

____20. The command(s) used to send data to a network printer is (are)

A. CAPTURE
B. NPRINT
C. Both A and B
D. None of the above

____21. Which of the following is a Novell menuing system rule?

A. The file used to contain menu specifications must be created using a DOS word processing application.
B. The menu filename must contain the word MENU.
C. Menu titles and choices must begin at the left margin.
D. None of the above

___22. File attributes can be assigned through

A. DOS
B. NOS
C. Both A and B
D. None of the above

___23. The physical pattern used to connect LAN devices is known as the

A. Protocol
B. Configuration
C. Topology
D. Token ring

___24. Netware's communication link between the network operating system (NOS) and local operating system (LOS) is

A. Software
B. File server
C. Cable
D. Shell

___25. Which of the following is not a Netware installation-created directory?

A. SYS
B. MAIL
C. LOGIN
D. PUBLIC

___26. The filer server's console prompt is displayed as

A. :_
B. F:_
C. |_
D. _

___27. The command to move back three directory structure levels is

A. CD..
B. CD\..
C. CD...
D. D....

___28. Which of the following is not a command line utility?

A. NCOPY
B. CASTOFF
C. IPX
D. VOLINFO

Complete the statements below by writing the correct answers in the blanks.

29. The menu utility name that is keyed to display the supervisor options is _____.

30. Name the key that is used to step back one submenu at a time inside any menu utility. _____

31. The first search drive assigned automatically by Netware (S1) takes the place of network drive _____.

32. Name the command used to terminate the execution of a login script. _____

33. The command used to display a Netware custom menu is _____.

34. An area of the file server used to collect and transfer print requests to printers is called a print _____.

35. The rights created through the combination of the rights mask and the trustee rights are known as the _____ rights.

36. The specific set of rules that a network complies with is known as the _____.

37. The new drive letter that is normally assigned from a PC attaching to a Netware network is _____.

38. Review the following file structure.

Key in the full path statement to the file DW as shown above.

39. The command line utility used to display a listing of Netware drive pointers is _____.

GLOSSARY

attributes — file designations that govern access to individual files; characteristics that can be turned on or off to determine user access

cable — used to attach communication devices on the network; most commonly used are twisted-pair wire, coaxial cable, and fiber optic cable

command line — DOS prompt

command line utilities — one of two common methods to manage most of Netware's resources; (the second method is SYSCON); executed directly from the command line

computer network — communications system of connected electronic devices.

connectivity — sharing of resources

console commands — one of the Netware programs that monitors or controls network activity; commands are entered through the file server's keyboard

contention — access scheme that monitors the network through a NIC adaptor

default login script — sets basic mappings to the system; cannot be edited; executed only when a user login script does not exist

directory structure — system of information organization used on the network; similar to the DOS structure

drive pointers — letters assigned by DOS to locate local devices such as A and C

effective rights — define what rights are available to the user; combination of rights mask and trustee rights; determines exactly what a user can do in a given directory; displayed through the RIGHTS command line utility

ethernet — type of NIC that uses a contention access scheme on a linear topology; common type of NIC adapter

file server — controls the hard disk and the connected users' requests

IPX/SPX — see Internet Packet eXchange

Internet Packet eXchange/Sequenced Packet eXchange (IPX/SPX) — protocol that controls the network communications through the shell

LAN — local area network

linear topology — connects cable from one device to the next until they are all attached

login script — file containing commands that are executed automatically each time a user logs into the network

LOS — local operating system; resides at the workstation and controls the PC operations

MAP command utility — used to assign drive pointers; mappings stay in effect only during the current session

maximum rights mask — determines the maximum rights that can be exercised in the directory; generally used to guarantee that a certain group of rights cannot be exercised in a directory

menu — software prompting

menu utilities — display menus that provide user execution of network tasks

Netware — most widely used network software; considered industry standard network operating system

network interface card (NIC) — circuit board that plugs into one of the available expansion slots on the PC; provides physical connection between PCs on the LAN

network operating system (NOS) — resides at the file server and controls the shared devices

NIC — network interface card; a circuit board that plugs into one of the available expansion slots on the PC; determines hardware characteristics such as the type of cable and topology that must be used; establishes the access scheme and transmission rate of the network

nodes — network workstations; the PCs connected to each other on the network

NOS — (see *network operating system*)

password security — used in conjunction with the login name to limit access to the file server; can be assigned to users by the supervisor or the individual user; may be from 1 to 20 characters in length

path — full directory structure name; consists of the names of the levels in the directory structure, beginning with the server name

protocol — specific set of rules that a network complies with

queue — (see *server print queue*)

rights — level of network security; assigned to directories and users; determine the privileges allowed in a given directory

rights mask — rights assigned directly to directories

ring topology — connects LAN devices in a circle, allowing communications to continuously circulate around the network.

root directory — first level of structure in the DOS environment

search drive pointers — used to access executable files located in a directory other than the current directory

server — combination of computer and software needed to manage resources on a network

server print queue — an area located within the server's RAM that is used to collect and transfer print requests to a specific printer to which the queue is assigned

shell — communication link between the NOS and the LOS; resides at the workstation, intercepts users' requests, and directs them either to the file server or the LOS; special piece of Netware software that is used to link the PC to the file server

SYSCON — one of two methods of managing the network; the other is command line utilities

system login script — executed for all users when they login to the network; contains commands needed to set environment parameters common to all users

token — an access packet that helps manage PC transmissions

token-ring — connects LAN devices in a circle, allowing communications to continuously circulate around the network

token passing — manages network transmissions by sending an access packet, called a token, to each workstation on the network; to transmit on the network, the PC seizes control of the token.

topology — physical pattern used to connect LAN devices through network cable

trustee — a network user who has been granted rights to a directory

trustee rights — rights given to users in specific directories

user login script — sets specific variables for individual users

VAP (Value Added Process) — third party software installed on the server to extend the basic Netware print services

volume — first level of Novell's Netware directory structure; multiple volumes may exist on one file server

WAN — wide area network

WHOAMI — views your current login status

workstations — also known as nodes; the PCs connected to each other on the network

WRITE (login script command) — displays information included inside quotes

Preiest/posttest answer key

The first record of the evaluation results database includes an answer key that may be printed or viewed as needed.

01	F	12	F	23	C	34	QUEUE
02	F	13	T	24	D	35	EFFECTIVE
03	T	14	B	25	A	36	PROTOCOL
04	F	15	A	26	A	37	F
05	F	16	C	27	D	38	BT\SYS:
06	F	17	C	28	D		SOFTWARE\
07	F	18	D	29	SYSCON		WORDPROC\
08	T	19	C	30	ESCAPE		DW
09	F	20	C	31	Z	39	MAP
10	T	21	C	32	EXIT		
11	F	22	C	33	MENU		

Student handouts

A copy of each lesson's outcomes and an explanation of concepts is included in this guide. A set of Student Handout Masters has been included for duplication purposes.

Learner outcomes

After completing this lesson, you will be able to:

1. Define a computer network.
2. Define a protocol.
3. Define a LAN.
4. Define a WAN.
5. List the benefits of a LAN.
6. Identify the components of a LAN.
7. Describe the function of each LAN component.

What is a network?

A *computer network* is simply a communications system of connected electronic devices. As the definition implies, the key ingredients are:

- electronic devices such as PCs, printers, modems, and fax machines
- communications system including hardware, operating system, and application software
- connectivity (sharing of resources)

Networks must be governed by a consistent set of rules. These rules set the guidelines for the devices to operate in a reliable system. The specific set of rules that a network complies with is known as the *protocol.*

Networks basically come in two varieties. One type, designed to cover a relatively short distance, is referred to as a *local area network (LAN).* The LAN is the subject of this tutorial. The other type, designed to cover a larger geographical distance, is referred to as a *wide area network (WAN).*

Benefits of using a network

The personal computer (PC), as its name implies, was first designed to put computing power in the hands of those who needed it the most, yet understood it the least: non-computer-literate employees. Businesses recognized that their survival depended on allowing

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not only gain direct access to, but also to manipulate electronic information.

This need led to a fundamental change in the centralized data processing approach used by most businesses at that time. That is, businesses began distributing computing responsibility throughout the organization. This action provided the platform for the development of both large-scale computing (systems) as well as individualized computing (PCs).

As the wide use of PCs proliferated, a serious shortcoming developed. With all its user-oriented benefits, the single-user device was not designed to share its resources.

The result of the lack of the PC flexibility was a huge business expense—duplication. Companies were forced to invest needlessly in multiple copies of software and hardware. As you might guess, it wasn't long before the idea of linking PCs together to form a coordinated multi-user "network" developed.

The process of linking PCs into a common network provides the following benefits.

1. A network enables users to share a variety of hardware devices such as printers, hard disks, modems, and fax machines.

2. A network provides a central point of control over the installation, configuration, and maintenance of software packages.

3. Users can share data residing on hard disks.

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Network components and their functions

The components of a LAN are the server, workstations, cable, and network interface card.

- Server

  LANs manage the shared resources on the network through the combination of a computer (normally a PC) and software (called a *network operating system* or *NOS*). This combination of computer and software is known as a *server*. Every LAN must have a "file" server which controls the hard disk and the connected users' requests.

- Workstation(s)

  The workstations (also known as *nodes*) are the PCs connected to each other on the network. The difference between LAN workstations and most large-scale systems is that in the LAN, processing is distributed among all the PCs. In the large-scale systems, all processing occurs in the central host machine.

- Cable

  Each communication device on the network is attached to the network through a transmission cable. The most common types of cable used on LANs are twisted-pair wire, coaxial cable, and fiber optic cable. The type chosen depends on such factors as cost and speed.

  The physical pattern used to connect LAN devices through network cable is known as the *topology*. Two types of topologies commonly used to network PCs are *linear* and *ring* configurations. The linear topology connects cable from one device to the next until all are attached. After the last device is attached, the cable or line simply stops at that device. The ring topology connects the devices in a circle, which allows communications to continuously circulate around

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the network. The ring is created by connecting the last device on the network to the first device.

- Network Interface Card

The *network interface card* (NIC) is a circuit board that plugs into one of the available expansion slots on the PC. When cable is attached to the NIC, the board provides the physical connection between the PCs on the LAN. The NIC selection determines hardware characteristics such as the type of cable and topology that must be used. It also establishes the access scheme and transmission rate of the network.

Some means of regulating access to the network must be used to control the flow of communications. Otherwise, simultaneous and conflicting transmissions would cause chaos. Two access schemes used on LANs are *contention* and *token passing*.

Contention LANs monitor the network through the NIC adaptor. If a transmission signal is detected, the workstation waits until the network is clear. Transmission takes place when the network is clear.

Token passing, on the other hand, manages transmissions by sending an access packet, called a *token*, to each workstation on the network. To transmit on the network, the PC seizes control of the token. Other PCs must wait until they have control of the token before transmitting.

The NIC adapter also determines the transmission rate. Two common types of NICs used on LANs are *ethernet* and *token-ring*. Ethernet networks use a contention access scheme on a linear topology. Generally, rates of transmission range from 1 to 10 million bits per second (Mbps).

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Token-ring networks use a token passing access scheme on a ring topology. Transmission rates range from 4 to 16 Mbps.

Although much is written about the comparisons of ethernet and token-ring networks, adapter choice should be based upon the needs of the particular network location.

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Learner outcomes

After completing this lesson, you will be able to:

1. Describe the purpose and role of Netware.
2. Identify the relationship of NOS and LOS.
3. Describe the type of protocol used in Netware LANs.
4. Describe Netware network installation steps.
5. Perform network boot procedures.

The purpose and role of Netware

Netware was developed by Novell, Inc. to allow groups of PCs to share access to data and devices attached to a network server. Today, Netware is the most widely used network software and is considered the industry standard network operating system (NOS).

Operating systems — NOS and LOS

The LAN has two major software components: a *network operating system* (NOS) and a *local operating system* (LOS).

The NOS (in this tutorial, Netware) resides at the file server and controls the shared devices. The LOS (typically DOS) resides at the workstation and controls the PC operations.

The communication link between these two operating systems is provided by the Netware shell. The shell resides at the workstation, intercepts users' requests, and directs them either to the file server or the LOS.

Netware protocol

You read that a network's protocol refers to the system of rules that governs operations. Novell developed a protocol for Netware known as *Internet Packet eXchange/Sequenced Packet eXchange* (IPX/SPX). This protocol controls the network communications through the *shell*.

The shell is a special piece of Netware software that is used to link the PC to the file server. The next section of this lesson explains the linking procedures.

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Network linking

Once the network hardware has been connected, the network software is installed. Netware installation includes the following steps.

1. Generate the shell.

   The workstation uses a shell to establish communications with the file server. A shell for each workstation is generated through Netware to set the proper NIC configuration.

   During generation, Netware creates a NETx.COM file, an IPX.COM file, and other boot files. The NETx.COM file (x stands for the DOS version) contains the shell that uses the IPX.COM file to achieve communications.

   Booting or linking a PC to the file server involves two steps. First, the PC is attached by executing the IPX.COM and NETx.COM programs. Second, the user obtains access to the network resources through logging in.

2. Configure the NOS.

   This step generates the network operating system file, NET$OS.EXE. This file contains information such as the file server hardware specifications and the network address of the file server NIC. NET$OS is the command used to boot the file server.

3. Copy the Netware software to the file server.

   This process converts the entire hard disk for Netware use, establishes a file server name, and copies the NOS files to the server

With Netware installed, you simply boot the file server and then boot the workstation(s).

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File server boot procedures:

1. Boot the server to DOS.
2. At the DOS prompt, execute the NET$OS command.
3. Use the console prompt to control/monitor network devices.

Workstation boot procedures:

1. Boot the workstation to DOS.
2. At the DOS prompt, execute IPX and NETx commands.
3. Login to the server.

NOTE: For the hands-on activities, you will need to remember the command NET$0S.

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Learner outcomes

After completing this lesson, you will be able to:

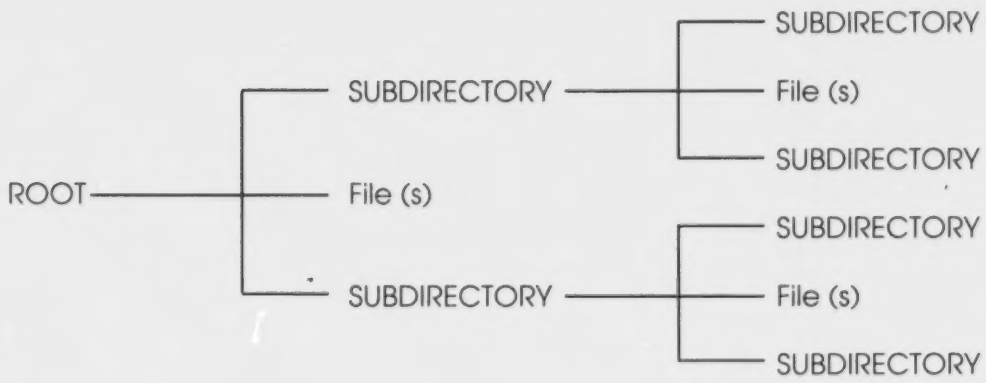
1. Name and describe the Netware directory structure.
2. Name the installation-created volume and directories.
3. List the contents of the installation-created directories.
4. Write a Netware directory path statement using proper syntax.
5. Execute DOS and Netware commands relating to the directory structure.

Directory structure levels

The system of information organization used on the network is known as the *directory structure*. It is similar to the DOS structure.

Within the DOS environment, the first level of structure is the root directory. The next level consists of subdirectories which may contain other subdirectories. Individual data files may reside at any structure level. (Figure 1)

Figure 1: DOS directory structure



Novell's Netware directory structure consists of three levels. The first level is the *volume*. It is similar to the DOS root directory in that information stems from this

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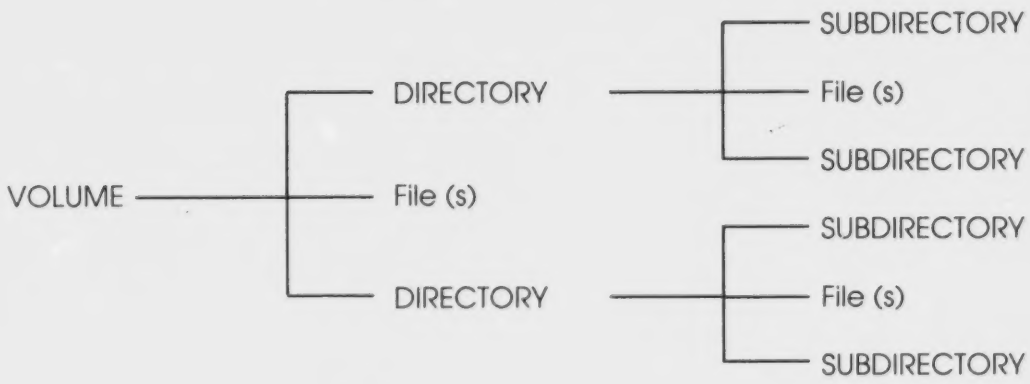
beginning location. It differs in that multiple volumes may exist on one file server. In the DOS structure, only one root directory may exist for each designated drive.

The second level of the Netware directory structure is the directories, which may contain subdirectories (third level). As in DOS, files may reside at any structure level. (Figure 2)

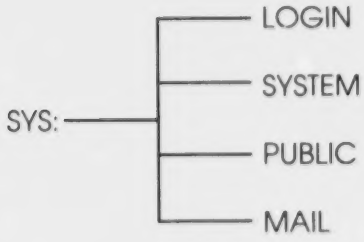
Figure 2: Netware directory structure



Netware's installation-created directory structure

During the installation of the network software, Netware automatically creates a volume containing specific directories and files. These are necessary to access the network's resources. (Figure 3)

Figure 3: Installation-created directory structure



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- LOGIN

  This directory contains programs necessary for logging into the file server.

- SYSTEM

  This directory contains the operating system files.

- PUBLIC

  This directory is used for general user access. It contains Netware commands and utilities available to network users.

- MAIL

  This directory contains subdirectories, which in turn contain user login scripts. Login scripts will be discussed in Lesson 7. This structure is also used by some third-party electronic mail packages.

Netware directory path statement

In order for the network operating system to locate a specific file, the full directory structure name (path) must be provided. The path consists of the names of the levels in the directory structure, beginning with the server name.

For example, in the structure in Figure 4, the full path to the file WP is:

BT/SYS:SOFTWARE/WORDPROC/WP

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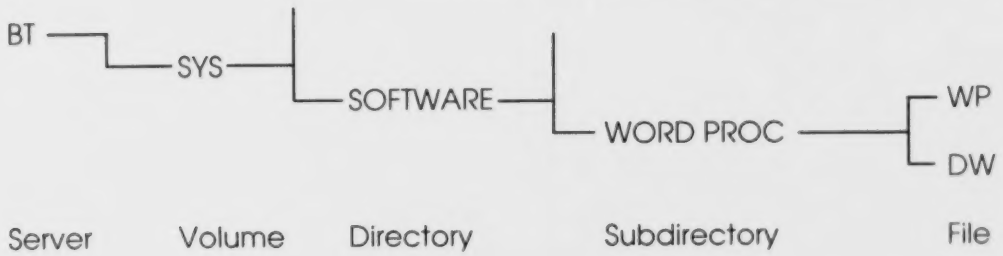
Figure 4: Directory structure name (path)



You can see the similarity of the Netware path structure to the DOS path structure. This makes the task of learning Netware much easier for experienced DOS users.

One difference you may have noticed is the character used to separate structure levels. Within DOS, the backslash (\) must be used as the separating character. Netware allows either the backslash (\) or the forward slash (/).

Directory structure utilities

Generally, two methods are available to manage most of Netware's resources. The first is *command utilities*. You should be familiar with entering this type of prompt line commands. This method utilizes DOS commands such as DIR, and Netware commands such as NDIR. Netware command line utilities are the subject of Lesson 5.

The second method to manage the network is menu utilities, such as SYSCON. Menu utilities are the subject of Lesson 6.

Hands-on activities include the following commands:

- DOS commands
  - CD
  - MD
  - RD
  - COPY CON
  - DIR
  - ERASE

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- Netware commands
  - CHKVOL
  - LISTDIR
  - NDIR
  - RENDIR
  - CD...

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Learner outcomes

After completing this lesson, you will be able to:

1. Define and identify DOS drive pointers.
2. Define Netware drive pointers.
3. Explain the purpose of network drive pointers.
4. Explain the purpose of search drive pointers.
5. Write a MAP command using proper syntax.
6. Use the MAP command to assign network drive pointers.
7. Use the MAP command to assign search drive pointers.

DOS drive pointers

After completing the first three lessons, you have been exposed to network and Netware basics, as well as directory structures. As you recall from Lesson 3, you were given new tools (Netware commands) to use with DOS commands to view and manipulate the file server structure.

You now need to explore the process Netware uses to maneuver through the directory structure. In your previous lesson, you used the CD command to move back and forth. This is acceptable and is used often in the DOS and Netware environments. But this method is very awkward and time-consuming when users are attempting to access programs and data files across the file server.

This problem is no different from that found in the DOS environment. The solutions used to move around the PC structure are *drive pointers* and the DOS *PATH* command. Drive pointers are letters assigned by DOS to locate local devices such as A and C. To move to the different drives, key the appropriate letter assigned to that drive, key a colon, and press [ENTER].

The DOS path command is used to access executable files that are located in a directory other than the current directory. This statement prevents the end-user from hunting or even knowing where the information is located before using the application.

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Netware drive pointers

Netware also uses drive pointers. However, whereas DOS basically uses the pointers to identify physical locations, Netware uses the pointers to identify logical locations. This means that in Netware, you may assign multiple drive letters (F: G: I:, for example) to identify different structure locations on the same physical drive.

Netware drive pointers are letters (usually F-Z) assigned by the operating system and the user to locate specific areas of the directory structure. Netware uses two types of pointers to accomplish this task: *network drive pointers* and *search drive pointers*. The total number of available drive pointers is 21.

Network drive pointers are used to reference locations of user-generated files. Although all 26 letters may be used to assign these drives, generally the first network drive is F:. DOS generally reserves drives A-E for local use. This leaves 21 available network drive letters (F-Z).

Search drive pointers (similar to the PATH statement) are used to access executable files located in a directory other than the current directory. A maximum of 16 search drive pointers may be assigned.

The search drives are assigned numbers that correspond to network drives in reverse order. That is, the first search drive (S1) takes the place of network drive Z and the second search drive (S2) takes the place of network drive Y. This means that each search drive assignment reduces the number of available network drives by 1.

Question: If all available search drives are assigned, how many network drive assignments may be made?

If your answer is 5, you're heading in the right direction. If not, see your instructor for additional assistance.

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MAP command

The MAP command utility is used to assign drive pointers. It is written in the following format:

MAP drive:=directory path

MAP — command
drive: — type of drive pointer
directory path — specific location in directory structure

Examples:

MAP G:=SYS:USERS\BRIAN
(network drive assignment)

MAP S2:=SYS:APPS\WP
(search drive assignment)

Notes:

1. Netware uses search drives to find a program in ascending search drive order.

2. Mappings stay in effect only during the current session.

3. To prevent the user from keying mappings for every session, drive pointers may be included in LOGIN SCRIPTS (Lesson 7).

Hands-on activities include network and search drive assignments.

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Learner outcomes

After completing this lesson, you will be able to:

1. Name commonly used command line utilities.
2. Explain the purpose of commonly used command line utilities.
3. Use commonly used command line utilities to control network resources.

Command line utilities

Netware utilities are provided by Novell to assist the user in controlling the network resources. The utilities are entered through a workstation.

Two types of utilities are available to the user.

- *Command line utilities* are executed directly from the command line.
- *Menu utilities* display menus that provide user execution of network tasks

The subject of this lesson is command line utilities. Although many commands are available, you will be introduced to the most commonly used utilities. Those pertaining to a specific lesson topic will be covered in detail at that time.

Command line utilities covered in this lesson:

- CASTOFF
  Prohibits workstations from receiving user messages
- CASTON
  Allows workstations to receive user messages
- CHKVOL
  Displays volume information
- LISTDIR
  Displays directory structure

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- LOGIN
  Permits users access to the file server
- LOGOUT
  Terminates current user network session
- MAP
  Views and assigns network drive assignments
- NCOPY
  Copies files from one location to another.
- NDIR
  Views file and subdirectory information
- RENDIR
  Renames a directory
- SEND
  Sends message to a group or another user.
- SLIST
  Displays a list of servers on the network
- SYSTIME
  Displays file server clock information
- USERLIST
  Lists users currently logged onto the file server
- WHOAMI
  Views your current login status

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Learner outcomes

After completing this lesson, you will be able to:

1. Name commonly used menu utilities.
2. Explain the purpose of commonly used menu utilities.
3. Use commonly used menu utilities to control network resources.
4. Use Netware's *Modify* and *Mark* function keys.

Once logged into the server, the workstation user has several tools (utilities) available for use. One type of these tools is the command line utilities (Lesson 5). The other type of tools available to the workstation user is menu utilities (the topic of this lesson).

In the design of Netware, Novell recognized that some users prefer to work at the DOS prompt (command line). Others want help in the form of software prompting (menus). Therefore, Netware offers both interfaces through command line utilities and menu utilities.

The number of available menu utilities depends on the Netware version you are using. This lesson will focus on the most commonly used menus:

SESSION	FCONSOLE
FILER	PCONSOLE
VOLINFO	PRINTCON
SYSCON	PRINTDEF

Each listed utility has an associated Netware menu. Each of these menus is activated by entering the specific requested menu name at the DOS prompt.

The intent of this network hands-on session is to identify the menu options that produce results similar to the command line utility tools. Two menu utility function keys (F3 and F5) will also be demonstrated.

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NOTE: The menu utilities do not represent a better tool, but an alternative tool to the command line utilities. Both tools add functionality to the workstation.

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Learner outcomes

After completing this lesson, you will be able to:

1. Contrast the three types of login scripts.
2. Name commonly used login script commands.
3. Explain the purpose of commonly used login script commands.
4. Create a system login script.
5. Name commonly used login script identifier variables.
6. Explain the purpose of commonly used identifier variables.
7. Create a user login script.

Login script

A login script is a file containing commands that are executed automatically each time a user logs into the network. The instructions are used to establish the user's initial network environment. Its purpose is similar to that of the AUTOEXEC.BAT file in DOS.

Three login scripts are used by the file server:

- System login script

  The system login script is executed for all users when they login to the network. This script contains commands needed to set environment parameters common to all users. Common settings would include network drive and search drive paths. This script can only be created or modified by the supervisor using the SYSCON menu utility.

- User login script

  The user login script sets specific variables for individual users. For example, if a user has a need to be mapped to a subdirectory not used by other users, the user login script is used to set this option. Supervisors or users can create and maintain this script file by using the SYSCON menu utility.

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- Default login script

  The default login script sets basic mappings to the system. This script, which cannot be edited, is executed only when a user login script does not exist.

Login script commands

Although several login script commands are available, you will examine seven of the most commonly used commands.

- MAP

  The MAP command is the most important command used in the login script. This allows automatic drive pointer assignments each time the login process is completed.

  Format: MAP H:SYS:\SYSTEM\SYSSUB

- COMSPEC

  This is a required command to prevent a possible system failure. Due to memory assignments, an application will sometimes overwrite the COMMAND.COM in RAM. Upon exiting the application, the system looks for COMMAND.COM. If needed, the COMSPEC command defines the path to COMMAND.COM to reload properly into the workstation.

  Format: COMSPEC=C:\COMMAND.COM

- REMARK

  This command allows comments to be placed in the login script.

  Format: REMARK This script is for all users

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- WRITE

  The command WRITE displays information included inside quotes.

  Format: WRITE "Greetings, Mary"

- PAUSE

  Similar to the DOS PAUSE command, it stops operation until any key is pressed.

  Format: PAUSE

- EXIT

  This command terminates the login script execution. A file name placed in quotes included with the EXIT command is run after exiting the script.

  Format: EXIT "WP"

  This will cause the script to terminate and file WP to execute.

- #

  This command initiates external execution of an .EXE or .COM file. After execution is complete, operation returns to the login script to complete the process.

  Format: #WP

  This will cause WP file to execute. Upon termination of WP, the remaining script commands will be processed.

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Login script identifier variables

Netware identifier variables are used to extract information from the server or from your workstation. This extracted information is then substituted inside the login script commands.

Identifier variable	Value substituted to script statement
LOGIN_NAME	user's LOGIN name
GREETING_TIME	morning, afternoon, or evening
HOUR	server hour of the day or night in 1-12 format
MINUTE	server minute on 60-minute format
AM_PM	a.m. or p.m. time modifier
STATION	workstation number, from server count

These variables can be used within the system or user login script. To distinguish them from other parameters, the identifier variables are preceded by a percent sign (%).

The hands-on session demonstrates login scripts that include:

- REMARK command to place a note inside the script file
- MAP command to assign a network drive
- MAP command to assign two search drives
- COMSPEC command to identify location of COMMAND.COM
- WRITE command to display a message
- PAUSE command to halt operations
- EXIT command to end system login script

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Learner outcomes

After completing this lesson, you will be able to:

1. Contrast three levels of Netware security.
2. Name the eight types of rights.
3. Explain the purpose of each right.
4. Define rights mask and trustee rights.
5. Name the three most commonly used file attributes.
6. Explain the purpose of each of the three file attributes.
7. Use a password to establish login security.
8. Use a rights mask and trustee rights to set effective rights.
9. Use attributes to assign special security properties.

Network security

A major deficiency of the DOS environment is that access to the system's resources is basically unrestricted. As long as users know various DOS commands, they can easily examine and duplicate sensitive data. As the numbers of PC users grow, so do the problems of limiting access.

With multiple users attached to a network, it is mandatory that a system be available to ensure that each user has appropriate access assignments. The Netware solution includes four levels of security.

- Login/Password
- Rights
- Attributes
- File Server

The lesson examines the first three levels of network security.

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Level 1: login/ password security

The initial access to the network is through the login procedure. As you have seen, gaining this access has been no more difficult than knowing the user name (ex.: SUPERVISOR or WS01). While easy to perform, this process also makes it very easy for unauthorized users to login to the network. Netware provides a solution to this open login process through *password* security. The optional password is used in conjunction with the login name to limit access to the file server. Passwords can be assigned to users by the supervisor or the individual user.

You now will return to the network session to create, change, and delete a password for user WS02. You will also logout and login to the network to see the effect of these changes.

Two methods may be used to maintain password security:

•SYSCON (menu utility)

•SETPASS (command line utility)

Passwords may be from 1 to 20 characters in length. Spaces are not allowed. Any space entered as part of a password will be converted to the underscore (_) character.

A general rule for passwords is the longer the length, the more secure your system is from unauthorized access.

Level 2: rights

The next level of network security is *rights*. Rights determine the privileges allowed in a given directory. Rights are assigned to directories and users.

Rights are assigned to directories through implementation of a *rights mask*. This implementation is accomplished using the FILER menu utility. The term "rights mask" refers to rights assigned directly to directories.

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Rights are assigned to users through implementation of *trustee rights*. This implementation is accomplished using the SYSCON menu utility or four related command line utilities: GRANT, REMOVE, REVOKE, and TLIST. The term "trustee rights" simply refers to rights given to users in specific directories.

The combination of the rights mask and trustee rights determines exactly what a user can do in a given directory. This combination is known as the *effective rights*, which can be displayed through the RIGHTS command line utility.

Now that you know rights can be assigned to directories (rights mask) and to users (trustee rights), the following paragraphs list and explain the purposes of the eight types of Netware rights.

Right	**Purpose**
READ	Read the contents of existing files
WRITE	Change or add to the contents of existing files
OPEN	Open an existing file (you must be able to open a file before you can read or write to it)
CREATE	Create a new file in the directory
DELETE	Erase an existing file
PARENTAL	Allows a user to give other users rights to the directory
SEARCH	Enables a user to list the files in the directory
MODIFY	Rename a file or subdirectory or change the file's attributes

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Rights mask

The rights mask in Netware 286 is called the *maximum rights mask*. As its name implies, the maximum rights mask determines the maximum rights that can be exercised in the directory.

The maximum rights mask is generally used to guarantee that a certain group of rights cannot be exercised in a directory. For example, you would not want a user to be able to delete or modify the contents of your WordPerfect program files.

Trustee rights

A *trustee* is a network user who has been granted rights to a directory. The eight trustee rights are the same as those used in the maximum rights mask.

When a new user is created, she or he is assigned as a trustee to only one subdirectory. This subdirectory is located in the directory structure SYS:MAIL. Also, as an automatic member of the group EVERYONE, this user is granted rights to the directories PUBLIC and MAIL.

To gain additional access, the user must be assigned trustee rights from the supervisor or the owners of other directories.

Effective rights

Effective rights define what rights are available to the user. Any rights that exist as both the rights mask and as trustee rights become the effective rights.

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For example, suppose your rights for directory WP51 are assigned as follows:

Maximum rights mask	[RWOCDP M]
Trustee rights	[R O S]

The effective rights are: R and O

Why? Because R and O are the only rights that exist in both the rights mask and the trustee rights.

Level 3: attributes

Attributes are file designations that govern access to individual files. You may already be familiar with attributes such as READ ONLY or ARCHIVE, from working with files using DOS. Attributes are characteristics that can be turned on or off to determine user access.

In a LAN environment, not all files can be treated equally. A shared, multiuser computer system must have a method to regulate user access at the file level.

Attributes provide the level of security to deal with individual file access. Attributes override effective rights. This lesson explores the three most commonly used file attributes.

- A - Archive (Modified Since Last Backup)

  The archive attribute is automatically turned on when a new file is created or an existing file has been changed. This allows backup procedures (if requested) to copy only those files containing changes (attribute turned on) since the last backup. The backup program turns off the archive attribute after copying the file. Netware 286 uses the terminology "Modified Since Last Backup" to represent the archive attribute.

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- B - RO/RW - Read Only/Read Write

  Making a file read-only means that you cannot *write to it, change it, or delete it, even if you have* effective rights to do so. If this attribute is not set, the user has read and write capabilities.

- C - S/NS - Shareable/Non-Shareable

  Files with the Shareable attribute turned on can be accessed by more than one user at a time. If the attribute is off for a particular file, it cannot be accessed by more than one user at a time.

  NOTE: When a new file is created, the following attributes are in effect:

  Modified Since Last Backup
  Read Write
  Non-Shareable

The menu utility FILER and command line utility FLAG are used to control file attributes.

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Learner outcomes

After completing this lesson, you will be able to:

1. Define Novell's menuing system.
2. Explain the purpose of the menuing system.
3. Name the rules that govern the menuing system operation.
4. Identify menu specifications proper format and syntax.
5. Use menuing system to execute custom menus.

Novell's menuing system

In the DOS environment, many users are not comfortable at the command line. Someprefer working on a workstation that prompts or guides them. The same conditions exist in the LAN environment.

Netware provides a system for the purpose of meeting these user concerns. The custom menu system is software the user can use to build menus that look and operate just like the Netware menu utilities.

Menuing system rules

The following rules govern the creation and display of custom menus.

1. The file containing the menu specifications must be an ASCII file created by an application that can save in DOS format.

2. The menu filename must use the extension .MNU.

3. The menu file contains three types of information:

   - Menu titles (names of menus that will appear as titles)

   - Menu choices (names/descriptions of menu options)

   - Commands (the actual commands invoked when a menu choice is selected)

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4. Menu titles and choices must begin with the left margin in the menu file. Menu title lines must be preceded by a percent (%) sign.

5. Command lines are placed immediately below the menu choice line, but must be indented at least two spaces from the left margin.

6. Custom menus are displayed using the Netware command MENU, followed by the name of the disk file containing the specifications (XXXXXXXX.MNU).

On the job, the responsibility for designing and implementing individual menus may be placed in your hands. This lesson's hands-on activities focus on the implementation of custom menus.

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Learner outcomes

After completing this lesson, you will be able to:

1. Name Netware printing command and menu utilities.
2. Explain the purpose of Netware printing command and menu utilities.
3. Identify steps in Netware printing setup/maintenance.
4. Perform Netware printing setup/maintenance functions.

Netware printing

The ability to share printers among multiple workstations is a fundamental consideration in many network software and hardware purchases. This lesson explores Netware print management commands and menus.

Netware versions 2.15 and below do not directly support locally attached printers. They do allow up to five printers to be attached to any one server. As an open operating system, Netware also allows third party software, referred to as *Value Added Processes* (VAPs) to be installed on the server to extend the basic Netware print services.

Network printing begins when you request an application running at your workstation to print a document. Rather than going directly to a locally attached printer, Netware reroutes the print job over the network cables to a *server print queue*. The server print queue is simply an area located within the server's RAM that is used to collect and transfer print requests to a specific printer to which the queue is assigned.

To be recognized by Netware, printers attached to the server must be defined. Each printer is assigned a printer number, 0 through 4. (Remember, the maximum number of attached printers is 5.)

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When Netware is first installed, a default printer (0) and an assigned default print queue (PRINTQ_0) are automatically created. Additional printers and queues may be created as needed.

The focus of the hands-on lesson is the setup and maintenance of the printer-sharing process using Netware commands/menus as follows:

Steps performed through

	Command	**Menu**
1.	Define Printers	PRINTDEF
2.	Define Print Queue and Users	PCONSOLE
3.	Attach Queues to Printers	SYSCON
4.	Create Print Job Definitions	PRINTCON
5.	Send Data to Printer	CAPTURE, ENDCAP, NPRINT
6.	Manage Print Jobs	PSTAT, PCONSOLE

With Netware, sharing printers is easy and provides several benefits. Instead of providing each user with a personal printer, fewer printers may be installed. Because fewer are needed and are accessed by multiple users, a variety of printers—including high-speed, high-quality printers—may be purchased to extend each user's capabilities. This also allows the business to share or spread the costs over many users.

One of the biggest problems you will encounter with PCs (stand-alone or network) is the lack of coordination among the printer hardware, the operating system, and the application software. Why?

DOS was not designed to monitor or even know what kinds of devices are connected to the output port. Also, the printer manufacturers do not specify printer features in the same way.

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The solution has been to supply printer drivers that work for specific printers with the software applications. This solution is not totally foolproof, however, because many software vendors provide unique drivers to the same printer.

The question then becomes: Who does what?

Netware provides limited print feature capabilities, and the hands-on activities focus on establishing and maintaining network print services.

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Learner outcomes

After completing this lesson, you will be able to:

1. Name commonly used file server console commands.
2. Explain the purpose of commonly used file server console commands.
3. Use commonly used file server console commands to control server-management tasks.

Console commands

In the previous lessons, you have been exposed to many Netware programs that monitor or control network activity. These programs have been presented in the form of either command line utilities or menu utilities.

Another group of Netware programs, called *console commands*, is also available to perform server-management tasks. These commands are entered through the file server's keyboard.

NOTE: Console commands may also be included with the file server's AUTOEXEC.SYS file through SYSCON, as introduced in Lesson 10.

Although many console commands are available, a few of the most commonly used will be the subject of this lesson. These commands will be presented in the following groupings:

Group	Console Command
File Server	MONITOR OFF DOWN
Messages	BROADCAST SEND
Printer	P Q

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As console commands are entered from the server's keyboard, their output displays on the server screen. When the server is booted (as you learned in Lesson 2), network adapters and print queues are initialized. Upon completion of these tasks, the server screen displays a colon (:) and a flashing cursor. This is known as the *colon* or *console prompt*. The console prompt is used in the same manner as the DOS prompt.

The hands-on activities focus on the three groups of console commands listed above.

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